UNIVERSITY OF SASKATCHEWAN **ELECTRICAL ENGINEERING 455.3**

Assignment Quiz 5 November 7, 1997

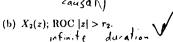
Instructor: B.L. Daku Time: 15 minutes Note: No aids

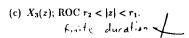
Name:

Student Number:



- 1. For the following Z-transforms, what are the defining charateristics of the inverse Ztransform. Use only the characteristics from the following list.
 - finite duration
 - infinite duration
 - causal
 - anticausal
 - two-sided
 - (a) $X_1(z)$; ROC Entire Z-plane except $z = \infty$.





2. Determine the Z-transform of the sequence x(n) (remember the ROC).

2. Determine the Z-transform of the sequence
$$x(n)$$
 (remember the ROC).
$$x(n) = -r^n e^{j\theta n} u(-n-1)$$

$$x(n) = -r^n e^{j\theta n} \frac{1}{2} - \frac{1}{2} = \frac{1}{2} \left(-re^{j\theta}\right)^n z^{-n}$$

$$= \frac{1}{1 - \left(-re^{j\theta}\right)^n z^{-n}}$$



$$\chi(\xi) = \frac{1 + re^{i\theta} \xi^{-1}}{1 + re^{i\theta} \xi^{-1}}$$



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1. Find the inverse z-transform of

$$X(z) = \frac{2z^2 - 3.25z}{(z - 0.25)(z - 3)} \quad \text{ROC } 0.25 < |z| < 3.$$

$$\frac{(X + 1)^{2} - (27 - 3.25)}{2} = \frac{27 - 3.25}{(7 - 25)(2 - 5)}$$

$$A = \frac{27 - 3.25}{(7 - 25)(2 - 5)}$$

$$A = \frac{27 - 3.25}{(7 - 2.5)}$$

$$= \frac{.5 - 3.25}{-2.75}$$

$$A = \frac{27 - 3.25}{(7 - 2.5)}$$

$$A = \frac{.5 - 3.25}{(7 - 2$$

2. A system has an input $x(n) = \delta(n) + 3\delta(n-2)$ and an output $y(n) = a^n u(n) +$ $3a^{(n-2)}u(n-2)$. What is the system function and the impulse response of the system? What values of a will ensure that the system is stable?

$$X(z) = \frac{1}{z} + \frac{3}{z^2}$$

$$Y(z) = \frac{1}{1 - az^{-1}} + \frac{3}{1 - az^{-2}}$$

$$= \frac{2^{-1} + 3z}{z^{-1}}$$

$$= \frac{2^{-1} + 3z^{2}}{(1 - az^{-1})(1 - az^{-1})}$$

$$= \frac{2^{-1} + 3z^{2}}{(1 - az^{-1})(1 - az^{-1})}$$

$$= \frac{2^{-1} + 3z^{2}}{(1 - az^{-1})(1 - az^{-1})}$$

$$H(z) = \frac{Y(z)}{X(z)} = \frac{4 - a(z^{-2} + 3z^{-1})}{(1 - az^{-1})(1 - az^{-1})(z^{-1} + 3z^{-1})} \qquad [a/2/z]$$

